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Gegründet im Jahre 1869 von H. Hlasiwetz, J. Loschmidt, J. Petzval und J. Stefan

EINLADUNG

zum Vortrag
von

Ao.Univ.Prof. Dr. Hinrich Grothe
Technische Universität Wien, Institut für Materialchemie

Biological Ice Nucleation

am

Dienstag, 17. Juni 2014, um 17:30 Uhr

Ort: Lise-Meitner-Hörsaal, Fakultät für Physik, Universität Wien,
1090 Wien, Strudlhofgasse 4 / Boltzmanngasse 5, 1. Stock

Barrierefreier Zugang: Boltzmanngasse 5, Lift, 1. Stock rechts über den Gang zum Hintereingang des Hörsaals

Abstract:
The ice nucleation of bioaerosols (bacteria, pollen, spores, etc.) is a topic of growing interest, since their impact on ice cloud formation and thus on radiative forcing, an important parameter in global climate, is not yet fully understood. Here we show that pollen of different species strongly differ in their ice nucleation behavior. The average freezing temperatures in laboratory experiments range from 240 to 255 K. As the most efficient nuclei (silver birch, Scots pine and common juniper pollen) have a distribution area up to the Northern timberline, their ice nucleation activity might be a cryo-protective mechanism. Far more intriguingly, it has turned out that water, which has been in contact with pollen and then been separated from the bodies, nucleates as good as the pollen grains themselves. The ice nuclei have to be easily-suspendable macromolecules located on the pollen. Once extracted, they can be distributed further through the atmosphere than the heavy pollen grains and so presumably augment the impact of pollen on ice cloud formation even in the upper troposphere.

In a joint study with TROPOS in Leipzig, we have primarily investigated the immersion freezing behavior of these ice nucleating active (INA) macromolecules. Therefore we measured the frozen fractions of particles generated from birch pollen washing water as a function of temperature at the Leipzig Aerosol Cloud Interaction Simulator (LACIS). Two different birch pollen samples were considered, with one originating from Sweden and one from the Czech Republic. For the Czech and Swedish birch pollen samples, freezing was observed to start at −19 and −17°C, respectively. As we assume INA macromolecules to be the reason for the ice nucleation, we concluded that birch pollen is able to produce at least two different types of these INA macromolecules.